

CLAIMS

1. An electronic package comprising:
 - a molded housing;
 - a circuit device encased within the housing;
 - multiple electrical leads extending from the housing, each of the electrical leads having an interior end within the housing, adjacent but separate from the device, and electrically connected to the circuit device, each of the electrical leads having an exterior end outside of the housing and adapted for electrical connection to a substrate; and
 - a thermally-conductive support structure electrically separate from the electrical leads, the support structure comprising a base portion within the housing and multiple thermal leads integral with and extending from the base portion, the circuit device being attached to the base portion, the thermal leads protruding outside the housing and having distal ends configured to dissipate heat conducted away from the circuit device through the base portion.
2. The electronic package according to claim 1, wherein portions of the electrical leads and the thermal leads are interdigitized along the perimeter of the base portion of the support structure.
3. The electronic package according to claim 1, wherein the electrical leads are electrically connected to the circuit device with wire bonds.
4. The electronic package according to claim 1, wherein the housing is an overmolded housing that protectively encases the circuit device, the base portion of the support structure, the interior ends of the electrical leads, and interior portions of the thermal leads.
5. The electronic package according to claim 1, wherein the

support structure and the electrical leads are separated portions of a single leadframe.

6. The electronic package according to claim 1, wherein the electrical and thermal leads diverge in opposite directions from each other outside the housing.

7. The electronic package according to claim 6, further comprising a heat sink thermally coupled to distal ends of the thermal leads.

8. The electronic package according to claim 1, wherein the base portion of the support structure and the interior ends of the electrical leads lie in the same plane within the housing.

9. The electronic package according to claim 1, wherein the base portion of the support structure and the interior ends of the electrical leads lie in different but parallel planes within the housing.

10. An IC package comprising:

an overmolded housing;

an integrated circuit chip encased within the housing;

multiple electrical leads extending from the housing, each of the electrical leads having an interior end within the housing, the interior ends of the electrical leads being adjacent but separate from an outer perimeter of the integrated circuit chip and spaced apart from each other along the perimeter of the integrated circuit chip, each of the electrical leads having an exterior end outside of the housing and adapted for electrical connection to a substrate;

means for electrically connecting the integrated circuit chip to the interior ends of the electrical leads; and

a thermally-conductive support structure electrically separate from the electrical leads, the support structure comprising a base portion within the housing and multiple thermal leads integral with and extending from the base portion, the integrated circuit chip being attached to the base portion, the thermal leads having interior portions contiguous with the base portion and having distal ends protruding outside the housing and configured to dissipate heat conducted away from the integrated circuit chip through the base portion, the interior portions of the thermal leads being interdigitized with the interior ends of the electrical leads along the perimeter of the base portion, the exterior ends of the electrical leads and the distal ends of the thermal leads diverging in opposite directions from each other outside the housing.

11. An electronic packaging method comprising the steps of:
providing a thermally and electrically conductive leadframe comprising a base portion and at least two sets of leads extending from the base portion;

separating a first set of the two sets of leads from the base portion and from a second set of the two sets of leads, each lead of the first set of leads having an interior end adjacent but separate from the base portion, each lead of the second set of leads having an interior portion that remains attached to the base portion;

mounting a circuit device to the base portion;

electrically connecting the circuit device to the interior ends of the first set of leads; and

encasing the circuit device, the base portion of the conductive leadframe, the interior ends of the first set of leads, and the interior portions of the second set of leads within a molded housing, exterior ends of the first set of leads projecting outside of the housing as connector terminals for the circuit device, distal ends of the second set of leads projecting outside of the housing as thermal dissipaters for the circuit device.

12. The electronic packaging method according to claim 11, wherein portions of the first and second sets of leads are interdigitized along the perimeter of the base portion as a result of the separating step and remain interdigitized following the encasing step.

13. The electronic packaging method according to claim 11, wherein the electrical connecting step is a wirebonding process that results in the interior ends of the first set of leads being electrically connected to the circuit device with wire bonds.

14. The electronic packaging method according to claim 11, wherein the encasing step is an overmolding process comprising the steps of:

placing the leadframe with the circuit device mounted thereon in a mold; and then

introducing an overmolding compound in the mold to protectively encase the circuit device, the base portion of the support structure, the interior ends of the first set of leads, and the interior portions of the second set of leads.

15. The electronic packaging method according to claim 11, further comprising the step of deforming the first and second sets of leads so that the exterior ends of the first set of leads and the distal ends of the second set of leads diverge in opposite directions from each other outside the housing.

16. The electronic packaging method according to claim 15, further comprising the step of transferring heat from the second set of leads to a heat sink attached to the distal ends of the second set of leads, or to air, a liquid, or a phase change material contacting the second set of leads.

17. The electronic packaging method according to claim 11, wherein following the separating step the base portion of the leadframe and the interior ends of the first set of leads lie in the same plane within the housing.

18. The electronic packaging method according to claim 11, wherein following the separating step the base portion of the leadframe and the interior ends of the first set of leads lie in different but parallel planes within the housing.

19. An IC packaging method comprising the steps of:
providing a thermally and electrically conductive leadframe comprising a base portion and at least two sets of leads extending from the base portion;
separating a first set of the two sets of leads from the base portion and from a second set of the two sets of leads, each lead 918) of the first set of leads having an interior end adjacent but separate from an outer perimeter of the base portion and spaced apart from each other along the perimeter of the base portion, each lead of the second set of leads having an interior portion that remains attached to the base portion, the interior portions of the second set of leads being interdigitized with the interior ends of the first set of leads along the perimeter of the base portion;
mounting an integrated circuit chip to the base portion;
electrically connecting the integrated circuit chip to the interior ends of the first set of leads;
encasing the integrated circuit chip, the base portion of the conductive leadframe, the interior ends of the first set of leads, and the interior portions of the second set of leads within an overmolded housing, exterior ends of the first set of leads projecting outside of the housing as connector terminals for the integrated circuit chip, distal ends of the second set of leads projecting outside of the housing as thermal dissipaters for the integrated circuit chip; and
forming the exterior ends of the first set of leads and the distal ends of the second set of leads to diverge in opposite directions from each other outside the housing.

20. The IC packaging method according to claim 19, further comprising the step of transferring heat from the second set of leads to a heat sink attached to the distal ends of the second set of leads, or to air, a liquid, or a phase change material contacting the second set of leads.